FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Price Cap Performance Review for Local Exchange Carriers	)	CC Docket No. 94-1

Reply Comments of Northern Telecom Inc.

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SUMMARY

In originally adopting a price cap regime, the Commission moved far in providing incentives to local exchange carriers (LECS) to invest efficiently in their networks. However, more should be done to ensure that LEC investment is in place to support the economic development, growth in employment, and more robust universal service that is possible from an advanced infrastructure.

This price cap review is an opportunity to implement stronger incentives for the acceleration of infrastructure development. As presently structured, price caps dampen the incentives of LECs to make wise investments.

These reply comments discuss several ways in which the Commission can adjust aspects its price cap model to ensure that the United States will continue to enjoy the benefits of an advanced telecommunications infrastructure. These alternatives include changing the treatment of depreciation rates, decreasing the productivity factor, or revising the sharing mechanism.

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Reply Comments of Northern Telecom Inc.

I. Introduction

Northern Telecom Inc. ("Northern Telecom") hereby files these reply comments on the Notice of Proposed Rulemaking in the above-captioned proceeding (the "Notice"). Northern Telecom focuses this reply on Baseline Issue 1a, "whether, and if so, how, the Commission should revise the local exchange carrier ("LEC") price cap plan to support the development of a ubiquitous national information infrastructure."[1/]

Northern Telecom supports continued evolution of the Commission's price cap regulatory structure to provide incentives for LECs to invest in an advanced information infrastructure for the United States. An up-to-date, ubiquitous infrastructure will serve two of the important goals set by Vice President Gore: improved economic development, and the provision of more robust,

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1/ Notice at ¶ 36.

universal communications service to U.S. consumers.[2/] In particular, additional wise investment in the infrastructure will make advanced services more broadly available to all Americans. This is especially important with respect to investments in the networks of the LECs, which, despite increases in competition at the local level, are the most nearly universal providers of common carrier service to American homes and businesses.

In the following, Northern Telecom suggests several ways in which the Commission could modify its price cap plan for LECs to help make investment in an advanced infrastructure a reality. The Commission's adoption of price caps for LECs in 1990 was a great step at that time toward promoting such investment. Several types of modest changes in the plan can motivate LECs to invest in their networks in ways that will benefit residential and business users for years to come.

II. An Advanced Information Infrastructure Can Promote the Delivery of Essential Services and Make Advanced Services More Equitably Available

Digital, switched, broadband communications networks, the kinds of networks that can be encouraged by the modification of the price caps regime that Northern Telecom is proposing, can provide the flexibility, capacity, speed and ease of use to

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2/ *See, e.g.*, Remarks of Vice President Al Gore, Communications Workers of America, Detroit, MI (June 14, 1994) at 2-3; Remarks of Vice President Al Gore, International Telecommunications Union, Buenos Aires, Argentina (Mar. 21, 1994); Remarks of Vice President Al Gore, Superhighway Summit, Academy of Television Arts and Sciences, Los Angeles, CA (Jan. 11, 1994).

provide a variety of essential and desirable services. This advanced infrastructure can:

- Affordably Expand Access to Health Care

Increasingly, affordable access to health care depends on the use of communications technology -- for remote patient review, diagnosis, and the coordination of patient records. Rapidly moving the growing amounts of data (such as treatment history, radiological images, test results) associated with patient care now requires the use of high-capacity networks. Only an advanced information infrastructure can accommodate this rapid growth and movement of patient data.

- Revitalize Local Communities

Several communities are beginning to use advanced networks to expand access to their public officials *via* electronic town hall meetings. Smaller, rural, isolated communities, such as those of the San Juan Islands off the coast of Washington State and the Oklahoma Panhandle, are also using advanced communication network technologies to link themselves to other communities.

- Equitably Deliver Education Opportunities to Learners of All Ages

The key to maintaining a society's viability in the information age is in replenishing the knowledge base of its citizens. Flexible life-long learning alternatives, requiring sophisticated communications technologies, will be necessary to help America keep pace with the rest of the world.

- Create Jobs in a Competitive Global Economy

Today's competitive global economy requires companies to obtain and act on the best information available. The WEFA Group, an economic analysis firm, has estimated that use of North Carolina Information Highway will generate an incremental 44,000 jobs state-

wide and $2.7 billion Gross State Product over the next ten years.[3/]

Northern Telecom calls its vision of these advanced information networks the Integrated Community Network™, which is designed to accommodate the rapid growth in network applications being driven by powerful demographic, social and economic forces.[4/] These new applications, especially those employing

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[3/] WEFA, "Economic Impact of Developing a Statewide Broadband Network in North Carolina," presentation to the Information Technologies Forum, Research Triangle Park, N.C. (Apr. 27, 1994).

[4/] Several communities throughout America are already implementing Integrated Community Networks. These initiatives include:

- Maryland Interactive Distance Learning Initiative

  In 1994, 270 sites throughout the state (ultimately expanding to 1,800 sites) will reach every Maryland high school and other educational facilities. This initiative included the development of a model application-based tariff established to support the equitable distribution of education and economic development throughout the state. The Maryland network will also support telecommuting options, telemedicine applications, and public safety and corrections initiatives.

- North Carolina Information Highway (NCIH)

  In 1994, 108 locations (ultimately expanding to reach 3,300 sites) will include educational, health care, government, and human services sites throughout the state.

- San Juan Islands Interactive Video Education Network

  This network links schools on these remote islands to the mainland.

- New York ClassNet

  This initiative links New York City public schools with City University of New York and the New York City Department of Telecommunications and Energy.

(continued...)

video conferencing or multi-media, require the flexibility, capacity, speed and ease of use that only an advanced information infrastructure can offer.

III. Changes to the Existing Price Cap Plan Could Provide Incentives for More Infrastructure Investment

A. The Current Price Cap Plan Continues to Distort Some Investment Decisions

One reason that the Commission adopted price caps for the LECs was to ensure more efficient investment practices. The Commission was concerned that under rate-of-return regulation, LECs might be motivated to overinvest in their networks, in order to expand the investment base on which they were permitted a regulated return.

The present price cap system seeks to remove such an incentive by regulating price levels, rather than returns on investment. The Commission's system seeks to reward LECs whose performance exceeds a benchmark measure of efficiency

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4/ (...continued)

- New York Community Learning Information Network (NY CLIN)

  NY CLIN links Lincoln Center, the Massachusetts Institute of Technology (MIT) Minority Monitoring Program, and New York City High Schools (as part of New York ClassNet) and is being expanded throughout western New York State.

- Missisippi Fibernet 2000

  This digital, switched, broadband network has been operating since 1989. It includes K-12 school districts, higher education institutions, and MS Educational TV.

improvements, implemented through the price cap index (the PCI), which is adjusted by an economy-wide inflation index and reduced by a productivity factor that seeks to reflect, among other things, the amount by which LEC productivity has historically exceeded that of the economy. The PCI is adjusted if a LEC incurs certain "exogenous" costs beyond its control.

The price cap system does not fully decouple LEC investment decisions from regulation, however. For example, the Commission and the states continue to regulate LEC depreciation rates, thus directly affecting investment decisions. Moreover, the Commission requires LECs to "share" with their customers revenues that exceed rate-of-return thresholds set by the Commission.[5/] Such mandated sharing dampens LECs' incentives to operate, and invest, efficiently. Possible changes to the price cap system that would permit more LEC infrastructure investment include revision of depreciation practices, decreasing the productivity factor, and elimination or modification of the sharing mechanism.

5/ Thus, LECs that choose a productivity factor of 3.3 percent must return to their customers half of their net revenues that are within the rate-of-return thresholds of 12.25 percent and 16.25 percent, and all earnings above that level. Alternatively, if a LEC elects a productivity factor of 4.3 percent, it must return to its customers half of its net revenues within the rate-of-return thresholds of 13.25 and 17.25 percent, and all earnings beyond 17.25%.

B. Depreciation Practices Could Be Revised

Under the existing price cap rules, a change in depreciation expense is treated as "endogenous," and the related revenue requirement must come from existing revenue streams. Based on USTA data,[6] the LECs' composite depreciation rate for the federal jurisdiction declined from 7.9 percent to 7.0 percent during the period 1988-1992. Over the same period, depreciation reserves increased from 33 percent to 39 percent.[7]

It appears that these changes resulted from the fact that, after divestiture, the LECs' existing analog network, which relied heavily on electromechanical switches, could not economically be modified to meet the needs of equal access. At the same time, the introduction of high capacity fiber-based transmission systems was displacing the LECs' large investment in interoffice circuit equipment. A large reserve deficiency remained, however, which the Commission addressed in the late 1980s by authorizing a five year amortization schedule, which terminated at the end of 1991. This action effectively increased the Bell Companies' depreciation rate by about one percentage point (typically from 7.0 percent to 8.0 percent).

Internally generated funds, primarily depreciation expense, were the main source of support for LEC construction

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[6] USTA Depreciation Subcommittee, Capital Recovery Indices Results Reports (July 1989-July 1993).

[7] A similar trend is exhibited over the same period on a combined federal-state basis, with the industry composite depreciation rate dropping from 7.7 percent to 7.0 percent while reserves increased from 33 percent to 38 percent.

programs over the period 1988-92, and remain so today. Those funds were used to accelerate the replacement of electromechanical switches. After completion of the amortization in 1991, the industry depreciation rate dropped to 7.0 percent in 1992.

Since 1991, the pace of technological and market evolution has continued to accelerate. For example, the prospects for competition from providers of Personal Communications Service (PCS) and cable television indicate that the use of copper loops may be approaching functional obsolescence. Moreover, the capacity and functionality of digital switches, coupled with volume price discounts, make it clear that under an economically rational replacement program, analog switches should be replaced expeditiously.[8/] Throughout the nation, switching networks based on digital technology could provide a capable platform for economically providing a full range of advanced services to all subscribers. The LECs' embedded investment in analog stored program controlled switches averages about $350 per access line, while the volume purchase price of replacement digital switches is about one-quarter this level.

In Europe and the Asian Rim, telecommunications providers comparable to the LECs are working with service lives for digital switching and copper cable that are at least ten

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[8/] Annual expense savings associated with digital switches compared to analog switches (including administration, provisioning, maintenance, and depreciation) can amount to about $30 per access line.

years shorter than in the United States.[9] During each of the years 1991 and 1992, industry estimates indicate that the Bell Companies invested about $130 per access line in new construction -- about $65 per access line for digital switching and transmission facilities, $45 per access line for outside plant, and $20 per access line for smaller items such as support facilities and computers. This is substantially less than that for local service providers in most European and Asian Rim countries, where $300 per access line is more typical.[10] Moreover, the Bell Companies typically allocate 20 percent of net revenue for new construction, while major overseas providers have averaged 40 percent.

An increase in depreciation rates to match more closely the economic lives of LEC assets would yield substantial public policy benefits. The resulting network modernization would support the rapid deployment of advanced, inexpensive services to American homes and businesses. It would permit the LECs to compete more strongly with others in offering such services. Depreciation reform would also reduce the risk to LEC shareholders that investment costs will not be fully recovered.

One possibility for reform of depreciation practices under price caps would focus on depreciation of two assets -- switching and outside plant (OSP), which includes predominantly

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[9] W.H. Davidson, R. Hubert, and E. St. Croix, Center for Telecommunications Management, Telecommunications Infrastructure Policy and Performance: A Global Perspective (Jan. 6, 1993), Tables 5.7 and 5.8.

[10] *See, id.*, App. B, Tables 5.1 and 5.2.

copper local loops. Based on reports from LECs to the Commission, at year-end 1992, the local loop represented a combined LEC investment of about $85 billion with a book reserve that averaged 35 percent for the large buried cable account (about $40 billion) to 45 percent for aerial and underground cables (combined total about $45 billion). It is reasonable that the OSP reserve ought to be over 60 percent in order to position LECs for the transition to a more advanced infrastructure. Given the magnitude of the increase, this is not something that an individual LEC can manage within existing financial constraints, particularly with endogenous treatment for depreciation.

Similarly, digital switching currently represents a combined LEC investment of $25 billion, which will continue to grow substantially. About one-half of this investment lies in the switches' line units, which, among other things, serve as the switches' interfaces with transmission facilities. As new applications, such as video dialtone, are included, an increasing number of line units will be retired more quickly than called for under current depreciation rates. This retirement could create a reserve deficiency of about $200-$300 million for a typical Bell Company.[11/]

11/ This amount was calculated assuming that the line units represent one-half the total investment and that the reserve for this portion ought to be about 50%, compared to the current level of about 30%.

C. Changes to the Productivity Factor Could Increase Investment

As noted above, under the price cap formula adopted by the Commission, LEC prices for local service and access are reduced annually by the productivity factor. This factor is designed to pass on to consumers, in the form of lower prices, all of the average expected increase in productivity from the provision of LEC services (along with a "Consumer Productivity Dividend"). National regulatory policy, as reflected in the current price cap structure, thus appears to specifically support consumption (lower prices).

The Commission should consider providing additional investment incentives to LECs through changes in the productivity factor. Northern Telecom has performed a hypothetical calculation of the potential revenues available to LECs if a portion of the productivity factor were made available to the LECs for a purpose, such as infrastructure development, other than lower prices, and the remaining portion was returned to customers in the form of lower prices.[12/]

The analysis calculates the LECs' revenue over a 25-year period (1992-2017) at specified growth rates under three scenarios: (1) a base case with no productivity factor, (2) the effect of the current baseline productivity factor (3.3 percent), and (3) the effect of a 2 percent productivity factor. The

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[12/] This analysis assumes that price caps will be a constraint over the study period, the baseline productivity offset remains constant, and price caps uniformly apply in federal and state jurisdiction.

result indicates the size of the expected pool of funds created by reducing the productivity factor used to lower real LEC prices to either 2 percent or 0 percent.[13/]

13/ These calculations are based on information from the Commission's Industry Analysis Division Statistics of Communications Common Carriers for 1992-1993. These show LEC revenues of about $66 billion in 1992 arising from local service ($40 billion) and carrier access ($26 billion). Excluded are toll revenues which are a major LEC revenue source, and any estimation of revenues from new services which could be offered if carriers invested in additional infrastructure. Unit growth for 1992-2017 traffic volumes is a variable for this analysis, and is assumed to be 2, 3, 4 or 5 percent. This number combines growth in access lines, plus message units, plus per minute growth in access charges, but does not take into account any elasticity effects. According to Commission statistics, the number of access lines has grown at a rate of about 2.5 percent to 4 percent per annum since 1985, while the number of access minutes grew at a rate of greater than 10 percent from 1985 to 1990, and at over 6 percent in 1991 and 1992.

Results of Analysis

The net LEC revenue results, exclusive of any tax effect,[14] calculated in the analysis are:

Real Growth	% Offset	Net Revenues Increase
2%	0%	$2,234 billion
	2%	$1,716 billion
	3.3%	$1,460 billion
3%	0%	$2,558 billion
	2%	$1,944 billion
	3.3%	$1,642 billion
4%	0%	$2,925 billion
	2%	$2,210 billion
	3.3%	$1,853 billion
5%	0%	$3,391 billion
	2%	$2,523 billion
	3.3%	$2,100 billion

According to these calculations, for example, a 4 percent volume growth in combination with a 2 percent (instead of 3.3 percent) real price decline would generate approximately $357 billion in real terms over the 25 year period.[15] This $357 billion pool could be allocated for a policy option such as

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[14] Tax effects could be important. To the extent that the increases were treated as taxable revenue, there would be a reduction in the net amounts available for infrastructure investment. Application of an investment tax credit or a similar tax policy would be desirable to provide consistent incentives for investment.

[15] Attachments A to D provide greater detail on these calculations. It should be noted that the amounts calculated would be generated over a 25 year period and are significantly back-end loaded (*i.e.*, more than one third of the monies arise in the last five years of the time frame).

network investment. While other uses are possible, adjusting the use of the productivity factor creates the potential for more investment (rather than immediate consumption by either customers or shareholders). This could provide policymakers and the LECs with the opportunity to accelerate significantly network modernization in the United States.

A small modification in the real price reduction under the price cap regulatory mechanism could be sufficient to fund all or a significant part of infrastructure plans now being discussed in the telecommunications industry. For example, under the assumptions stated above, if the productivity factor were reduced from 3.3 percent to 2 percent, then, at rates of growth from 2 percent to 5 percent, the additional funds available could range from $256 billion to $423 billion. If the Commission were to adjust the productivity factor to support further investment in network infrastructure, care should be taken to establish controls to ensure that such investment is "information highway" related.

D. The Sharing Mechanism Could Be Revised or Removed

As other parties have noted, the price cap sharing mechanism lessens the incentives for efficient LEC investment by limiting the revenues that LECs can retain in excess of the specified rate-of-return thresholds.[16] Elimination of the sharing mechanism would increase the efficiency incentive for

[16] *See also* Notice at ¶ 47.

LECs, although, as other commenters have recognized, the regulatory schemes of state commissions directly affect most LEC regulated service investments.[17] Additional investment in a more efficient infrastructure would have sustained benefits for Americans by ensuring that advanced communications are available to both residential and business users on a long-term basis. The savings in time and travel possible from the use of such services, as well as the use of the infrastructure in essential services such as health care and education, argue strongly for measures such as elimination of sharing.

Of course, other varieties of sharing mechanisms are possible. Several states, including Wisconsin, Pennsylvania, California, Michigan, and Tennessee, have developed variations on sharing mechanisms requiring a LEC to make infrastructure investments with, *e.g.*, revenues earned over a rate-of-return threshold.[18] Because of the importance of continued wise investment in LEC networks, we encourage the Commission to eliminate or modify its sharing requirement accordingly.

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[17] *See, e.g.*, comments of Computer and Communications Industry Association (CC Docket No. 94-1), at 9 (May 9, 1994).

[18] *See, e.g.*, Telecommunications Reports, June 27, 1994, at 6-7, 9; id., July 5, 1993, at 24; Alternative Regulatory Frameworks for Local Exchange Carriers, 107 PUR4th 1, 104 (1989); Michigan Bell Tel. Co., 111 PUR4th 1, 21-23 (1990); and Telecommunications Reports, Aug. 6, 1990, at 12-14.

IV. Conclusion

The Commission should use this price cap review as an opportunity to implement incentives for the acceleration of infrastructure development. As presently structured, price caps dampen the incentives of LECs to make wise investments. As discussed in these Reply Comments, the Commission can adjust several aspects of its price cap model, including depreciation rates, the productivity factor, or the sharing mechanism, to ensure that the United States will continue to enjoy the benefits of a first class telecommunications infrastructure. In the increasingly competitive global economy, such steps will lead to sustained economic growth and the creation of new jobs.

Respectfully submitted,

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NORTHERN TELECOM
COMPARISON OF REVENUES
ALTERNATIVE PRODUCTIVITY OFFSETS

YEAR	BASE CASE		ALTERNATIVE PRODUCTIVITY OFFSET			$ DIFFERENCE		% DIFFERENCE	
	GROWTH RATE 2.00%								
	PROD. OFFSET 3.30%								
	REVENUE (IN BILLIONS)		PRODUCTIVITY	REVENUE (IN BILLIONS)		REVENUE (IN BILLIONS)		REVENUE	
	ANNUAL	CUMULATIVE	OFFSET	ANNUAL	CUMULATIVE	ANNUAL	CUMULATIVE	ANNUAL	CUMULATIVE
1992	$66	$66		$66	$66	$0	$0	0.00%	0.00%
1993	65	132	2.00%	66	133	1	1	1.34%	0.67%
1994	65	196	2.00%	66	199	2	3	2.71%	1.34%
1995	64	260	2.00%	66	265	3	5	4.09%	2.01%
1996	63	323	2.00%	66	331	3	9	5.49%	2.69%
1997	62	385	2.00%	66	398	4	13	6.90%	3.37%
1998	61	446	2.00%	66	464	5	18	8.34%	4.05%
1999	60	506	2.00%	66	530	6	24	9.80%	4.73%
2000	59	566	2.00%	66	596	7	31	11.27%	5.42%
2001	59	624	2.00%	66	662	7	38	12.77%	6.11%
2002	58	682	2.00%	66	728	8	46	14.29%	6.80%
2003	57	739	2.00%	66	794	9	55	15.82%	7.50%
2004	56	795	2.00%	66	860	10	65	17.38%	8.20%
2005	55	851	2.00%	66	926	11	76	18.96%	8.90%
2006	55	905	2.00%	66	992	11	87	20.56%	9.61%
2007	54	959	2.00%	66	1,058	12	99	22.18%	10.31%
2008	53	1,013	2.00%	66	1,124	13	112	23.82%	11.02%
2009	53	1,065	2.00%	66	1,190	13	125	25.49%	11.74%
2010	52	1,117	2.00%	66	1,256	14	139	27.17%	12.45%
2011	51	1,168	2.00%	66	1,322	15	154	28.88%	13.17%
2012	50	1,218	2.00%	66	1,388	15	169	30.61%	13.89%
2013	50	1,268	2.00%	66	1,453	16	185	32.37%	14.62%
2014	49	1,317	2.00%	66	1,519	17	202	34.15%	15.34%
2015	48	1,366	2.00%	66	1,585	17	219	35.95%	16.07%
2016	48	1,413	2.00%	66	1,651	18	237	37.78%	16.81%
2017	47	1,460	2.00%	66	1,716	19	256	39.63%	17.54%
TOTAL	$1,460			$1,716		$256			

Attachment A

NORTHERN TELECOM
COMPARISON OF REVENUES
ALTERNATIVE PRODUCTIVITY OFFSETS

YEAR	BASE CASE		ALTERNATIVE PRODUCTIVITY OFFSET			$ DIFFERENCE		% DIFFERENCE	
	GROWTH RATE 3.00%								
	PROD. OFFSET 3.30%								
	REVENUE (IN BILLIONS)		PRODUCTIVITY	REVENUE (IN BILLIONS)		REVENUE (IN BILLIONS)		REVENUE	
	ANNUAL	CUMULATIVE	OFFSET	ANNUAL	CUMULATIVE	ANNUAL	CUMULATIVE	ANNUAL	CUMULATIVE
1992	$66	$66		$66	$66	$0	$0	0.00%	0.00%
1993	66	132	2.00%	67	133	1	1	1.34%	0.67%
1994	66	198	2.00%	68	201	2	3	2.71%	1.35%
1995	66	264	2.00%	68	269	3	5	4.09%	2.03%
1996	65	329	2.00%	69	338	4	9	5.49%	2.71%
1997	65	394	2.00%	70	408	4	13	6.90%	3.41%
1998	65	459	2.00%	70	478	5	19	8.34%	4.10%
1999	65	523	2.00%	71	549	6	25	9.80%	4.80%
2000	64	588	2.00%	72	620	7	32	11.27%	5.51%
2001	64	652	2.00%	72	692	8	41	12.77%	6.22%
2002	64	715	2.00%	73	765	9	50	14.29%	6.94%
2003	63	779	2.00%	74	839	10	60	15.82%	7.67%
2004	63	842	2.00%	74	913	11	71	17.38%	8.40%
2005	63	905	2.00%	75	988	12	83	18.96%	9.13%
2006	63	968	2.00%	76	1,063	13	96	20.56%	9.87%
2007	62	1,030	2.00%	76	1,140	14	109	22.18%	10.62%
2008	62	1,093	2.00%	77	1,217	15	124	23.82%	11.37%
2009	62	1,155	2.00%	78	1,295	16	140	25.49%	12.13%
2010	62	1,216	2.00%	79	1,373	17	157	27.17%	12.89%
2011	61	1,278	2.00%	79	1,452	18	175	28.88%	13.66%
2012	61	1,339	2.00%	80	1,532	19	193	30.61%	14.44%
2013	61	1,400	2.00%	81	1,613	20	213	32.37%	15.22%
2014	61	1,461	2.00%	82	1,695	21	234	34.15%	16.01%
2015	61	1,521	2.00%	82	1,777	22	256	35.95%	16.80%
2016	60	1,582	2.00%	83	1,860	23	278	37.78%	17.60%
2017	60	1,642	2.00%	84	1,944	24	302	39.63%	18.40%
TOTAL	$1,642			$1,944		$302			

Attachment B

NORTHERN TELECOM
COMPARISON OF REVENUES
ALTERNATIVE PRODUCTIVITY OFFSETS

YEAR	BASE CASE		ALTERNATIVE PRODUCTIVITY OFFSET			$ DIFFERENCE		% DIFFERENCE	
	GROWTH RATE 4.00% PROD. OFFSET 3.30%								
	REVENUE (IN BILLIONS)		PRODUCTIVITY	REVENUE (IN BILLIONS)		REVENUE (IN BILLIONS)		REVENUE	
	ANNUAL	CUMULATIVE	OFFSET	ANNUAL	CUMULATIVE	ANNUAL	CUMULATIVE	ANNUAL	CUMULATIVE
1992	$66	$66		$66	$66	$0	$0	0.00%	0.00%
1993	67	133	2.00%	68	134	1	1	1.34%	0.67%
1994	67	200	2.00%	69	203	2	3	2.71%	1.36%
1995	67	268	2.00%	70	273	3	5	4.09%	2.04%
1996	68	336	2.00%	72	345	4	9	5.49%	2.74%
1997	68	404	2.00%	73	418	5	14	6.90%	3.44%
1998	69	472	2.00%	74	492	6	20	8.34%	4.16%
1999	69	541	2.00%	76	568	7	26	9.80%	4.88%
2000	69	611	2.00%	77	645	8	34	11.27%	5.60%
2001	70	681	2.00%	79	724	9	43	12.77%	6.34%
2002	70	751	2.00%	80	804	10	53	14.29%	7.08%
2003	71	821	2.00%	82	886	11	64	15.82%	7.83%
2004	71	893	2.00%	83	969	12	77	17.38%	8.59%
2005	71	964	2.00%	85	1,054	14	90	18.96%	9.36%
2006	72	1,036	2.00%	87	1,141	15	105	20.56%	10.14%
2007	72	1,108	2.00%	88	1,229	16	121	22.18%	10.92%
2008	73	1,181	2.00%	90	1,319	17	138	23.82%	11.72%
2009	73	1,254	2.00%	92	1,411	19	157	25.49%	12.52%
2010	73	1,327	2.00%	93	1,504	20	177	27.17%	13.33%
2011	74	1,401	2.00%	95	1,599	21	198	28.88%	14.15%
2012	74	1,475	2.00%	97	1,696	23	221	30.61%	14.98%
2013	75	1,550	2.00%	99	1,795	24	245	32.37%	15.82%
2014	75	1,625	2.00%	101	1,896	26	271	34.15%	16.66%
2015	76	1,701	2.00%	103	1,999	27	298	35.95%	17.52%
2016	76	1,777	2.00%	105	2,104	29	327	37.78%	18.39%
2017	76	1,853	2.00%	107	2,210	30	357	39.63%	19.26%
TOTAL	$1,853			$2,210		$357			

Attachment C

NORTHERN TELECOM
COMPARISON OF REVENUES
ALTERNATIVE PRODUCTIVITY OFFSETS

YEAR	BASE CASE		ALTERNATIVE PRODUCTIVITY OFFSET			$ DIFFERENCE		% DIFFERENCE	
	GROWTH RATE 5.00%								
	PROD. OFFSET 3.30%								
	REVENUE (IN BILLIONS)		PRODUCTIVITY	REVENUE (IN BILLIONS)		REVENUE (IN BILLIONS)		REVENUE	
	ANNUAL	CUMULATIVE	OFFSET	ANNUAL	CUMULATIVE	ANNUAL	CUMULATIVE	ANNUAL	CUMULATIVE
1992	$66	$66		$66	$66	$0	$0	0.00%	0.00%
1993	67	134	2.00%	68	135	1	1	1.34%	0.68%
1994	68	202	2.00%	70	205	2	3	2.71%	1.36%
1995	69	272	2.00%	72	277	3	6	4.09%	2.06%
1996	71	342	2.00%	74	352	4	9	5.49%	2.77%
1997	72	414	2.00%	77	428	5	14	6.90%	3.48%
1998	73	486	2.00%	79	507	6	20	8.34%	4.21%
1999	74	560	2.00%	81	588	7	28	9.80%	4.95%
2000	75	635	2.00%	83	671	8	36	11.27%	5.69%
2001	76	711	2.00%	86	757	10	46	12.77%	6.45%
2002	77	788	2.00%	88	845	11	57	14.29%	7.22%
2003	78	867	2.00%	91	936	12	69	15.82%	8.00%
2004	80	947	2.00%	93	1,030	14	83	17.38%	8.79%
2005	81	1,027	2.00%	96	1,126	15	99	18.96%	9.59%
2006	82	1,110	2.00%	99	1,225	17	115	20.56%	10.40%
2007	83	1,193	2.00%	102	1,327	18	134	22.18%	11.22%
2008	85	1,278	2.00%	105	1,432	20	154	23.82%	12.06%
2009	86	1,364	2.00%	108	1,540	22	176	25.49%	12.90%
2010	87	1,451	2.00%	111	1,651	24	200	27.17%	13.76%
2011	89	1,539	2.00%	114	1,765	26	225	28.88%	14.63%
2012	90	1,629	2.00%	118	1,882	28	253	30.61%	15.51%
2013	91	1,721	2.00%	121	2,003	30	282	32.37%	16.41%
2014	93	1,814	2.00%	124	2,128	32	314	34.15%	17.32%
2015	94	1,908	2.00%	128	2,256	34	348	35.95%	18.24%
2016	96	2,003	2.00%	132	2,387	36	384	37.78%	19.17%
2017	97	2,100	2.00%	136	2,523	38	423	39.63%	20.12%
TOTAL	$2,100			$2,523		$423			

Attachment D

CERTIFICATE OF SERVICE

I, Laura E. Magner, hereby certify that on the 29th day of June 1994, a true copy of the foregoing Reply Comments of Northern Telecom Inc. was mailed, postage prepaid, to:

Charles A. Zielinski
Rogers & Wells
607 14th Street, N.W.
Washington, D.C. 20005

Counsel for Computer & Communications Industry Association

and was hand delivered to:

Chairman Reed Hundt
Federal Communications Commission
1919 M Street, N.W.
Room 814
Washington, D.C. 20554

Commissioner James H. Quello
Federal Communications Commission
1919 M Street, N.W.
Room 802
Washington, D.C. 20554

Commissioner Andrew C. Barrett
Federal Communications Commission
1919 M Street, N.W.
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Commissioner Susan Ness
Federal Communications Commission
1919 M Street, N.W.
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Commissioner Rachelle B. Chong
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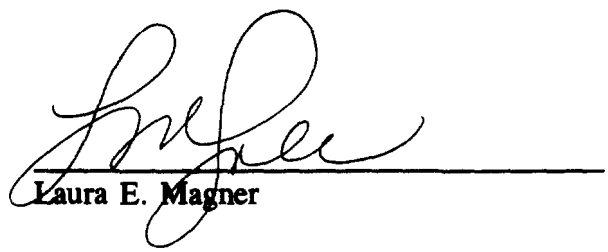

Laura E. Magner